Claims

1. Cardiovascular prostheses with an endothelial cell surface produced in that after an initial sub-confluent seeding of the surface on the blood contact side, the formation of a confluent monolayer ensues by the cells growing under a permanent influence of defined pulsatile shear forces increasing up to physiological values, by means of streaming the prosthesis surface on the blood contact side along the main axis of the prosthesis in an inner perfusion circuit and by moistening the outer prosthesis wall in an outer perfusion circuit, or in a permeable medium reservoir.

2. Cardiovascular prostheses according to claim 1, characterized in that the increasing shear forces are generated by means of a program-controlled pumping device (7).

3. Cardiovascular prostheses according to claims 1 and 2, characterized in that the mathematical value of the increasing shear forces can be selected variably and time-independently.

4. Cardiovascular prostheses according to claims 1 through 3, characterized in that the mathematical value and the final value of the shear forces can be selected freely and time-variably by means of a program control according to the physiological conditions of the implantation location.

5. Cardiovascular prostheses according to claims 1 through 4, characterized in that the mathematical value of the occurring shear forces can be adjusted by varying the pumping capacity, as well as by varying the size of the cross-section of the pumping tubes used or of any other connecting elements outside of the chamber, as well as by the geometrical form and configuration of the very chamber.

6. Cardiovascular prostheses according to claims 1 through 5, produced by means of a perfusion circuit consisting of an inner perfusion circuit (5) for streaming the prosthesis surface on the blood contact side along the main axis of the prosthesis

inside of the chamber (2), said prosthesis (1) being fixed in the inner space thereof by means of adapters (3, 3'), and hence constituting as such the inner perfusion circuit (5), and an outer perfusion circuit (5') for outwardly streaming the prosthesis (1) within the same chamber (2) which comprises, towards the outside, connections to a pumping device (7) for both circuits (5, 5'), as well as to the medium reservoirs (6, 6') which also have the function of pressure equation reservoirs.

7. Cardiovascular prostheses according to claims 1 through 6, produced by means of a perfusion circuit consisting of an inner perfusion circuit (5) for streaming the prosthesis surface on the blood contact side along the main axis of the prosthesis inside of the chamber (2), said prosthesis (1) being fixed in the inner space thereof by means of an adapter (3), and hence constituting as such the inner perfusion circuit (5), and an outer perfusion circuit (5') uniting inside of the chamber (2) with the inner perfusion circuit (5) after having streamed the prosthesis (1) for outwardly streaming the prosthesis (1) within the same chamber (2) which comprises, towards the outside, connectors to a pumping device (7) for both circuits (5, 5'), as well as to the medium reservoirs (6, 6') which also have the function of pressure equation reservoir.

8. Cardiovascular prostheses according to claims 6 and 7, characterized in that the outer perfusion circuit (5') can be operated in co-current or in counter-current to the inner perfusion circuit (5), but also statically.

9. Cardiovascular prostheses according to claims 6 through 8, characterized in that the perfusion circuits lead from one medium reservoir (6) into another medium reservoir (6'), in which the medium is collected which has already streamed through the prosthesis.

10. Cardiovascular prostheses according to claims 6 through 8, characterized in that the inner and the outer perfusion circuits have different medium reservoirs or one and the same medium reservoir (6, 6').

11. Cardiovascular prostheses according to claims 6 through 8, characterized in that the prosthesis is present in the very medium reservoir, and that the inner and the outer perfusion circuits are thereby connected with each another.

12. Cardiovascular prostheses according to claims 6 through 11, characterized in that the medium reservoirs are comprised of expandable blood bags of the materials PVC or EVAM.

13. Cardiovascular prostheses according to claims 6 and 7, characterized in that the realization of the adapters (3, 3') for fixing the prosthesis (1) can be realized as an olive, cones with clamping means or as an expansion member.

14. Cardiovascular prostheses according to claims 6, 7 and 13, characterized in that the length of the prosthesis to be clamped can be varied by constructionally providing at least one closing part with the adapter (3 or 3') of chamber (2).

15. Cardiovascular prostheses according to claims 6 and 7, characterized in that the chamber (2) is manufactured from a transparent material.

16. Cardiovascular prostheses according to claims 1 through 15, characterized in that the prosthesis is used as a vascular prosthesis, a heart valve prosthesis or a stent.

17. Method for covering cardiovascular prostheses with endothelial cells according to claims 1 through 16, characterized in that after an initial sub-confluent seeding of the prosthesis surface on the blood contact side, the formation of a confluent monolayer ensues by the cells growing under permanent influence of defined pulsatile shear forces increasing up to physiological values by means of streaming the prosthesis surface on the blood contact side along the main axis of the prosthesis in an inner perfusion circuit, and a moistening of the outer prosthesis wall in an outer perfusion circuit or in a permeable medium reservoir.

18. The method according to claim 17, characterized in that

a) the increasing shear forces are generated by means of a program-controlled pumping device (7),

b) the mathematical value of the increasing shear forces can be selected variably and time-independently,

c) the mathematical value and the final value of the shear forces can be selected freely and time-variably by a program control according to the physiological conditions of the implantation location, and

d) the mathematical value of the arising shear forces can be adjusted by varying the pumping capacity, as well as by varying the size of the cross-section of the pumping tubes used or of any other connecting elements outside of the chamber as well as by the geometrical form and configuration of the very chamber.

19. The method according to claims 17 and 18, characterized in that in an inner perfusion circuit (5) for streaming through the inner prosthesis space along the main axis of the prosthesis inside of the chamber (2), the prosthesis (1) is fixed by means of adapters (3, 3'), and hence as such constitutes the inner perfusion circuit (5), and that an outer perfusion circuit (5') exists for outwardly streaming the prosthesis (1) in the same chamber (2) which, towards the outside, comprises for the two circuits (5, 5') connectors to a pumping device (7) and the medium reservoirs (6, 6') which also have the function of pressure equation reservoirs.

20. The method according to claims 17 through 19, characterized in that

a) the outer perfusion circuit (5') can be operated in co-current or counter-current to the inner perfusion circuit (5), but also statically,

b) the two perfusion circuits (5, 5') do not work as a closed system but lead from one medium reservoir (6) into another medium reservoir (6'), in which the medium is collected which has already streamed through the prosthesis,

c) the inner and the outer perfusion circuits have different medium reservoirs or one and the same medium reservoir (6, 6'), and

d) the two perfusion circuits (5, 5') unite inside the chamber (2) after having streamed the prosthesis (1), but leave the chamber (2) in separate perfusion circuits (5, 5').

21. The method according to claims 17 through 20, characterized in that the prosthesis is present in the very medium reservoir and that the inner and the outer perfusion circuits are thereby connected with each another.

Add (5)